

# TRANSMITTAL FORM

Application Serial Number	10 802,186
Filing Date	March 17, 2004
First Named Inventor	Cheng
Group Art Unit	2812
Examiner Name	Not yet assigned
Attorney Docket No.	ASC-025DV2C1
Patent No.	Not applicable
Issue Date	Not applicable


## ENCLOSURES (check all that apply)

<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Check Attached <input type="checkbox"/> Copy of Fee Transmittal Form	<input type="checkbox"/> Copy of Notice to File Missing Parts of Application <input type="checkbox"/> Formal Drawing(s) <input type="checkbox"/> Request For Continued Examination (RCE) Transmittal <input type="checkbox"/> Power of Attorney (Revocation of Prior Powers) <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Executed Declaration and Power of Attorney for Utility or Design Patent Application <input type="checkbox"/> Small Entity Statement <input type="checkbox"/> CD(s) for large table or computer program <input type="checkbox"/> Amendment After Allowance <input type="checkbox"/> Request for Certificate of Correction <input type="checkbox"/> Certificate of Correction (in duplicate)	<input type="checkbox"/> Notice of Appeal to Board of Patent Appeals and Interferences <input type="checkbox"/> Appeal Brief (in triplicate) <input type="checkbox"/> Status Inquiry <input checked="" type="checkbox"/> Return Receipt Postcard <input checked="" type="checkbox"/> Certificate of First Class Mailing under 37 C.F.R. 1.8 <input type="checkbox"/> Certificate of Facsimile Transmission under 37 C.F.R. 1.8 <input type="checkbox"/> Additional Enclosure(s) (please identify below)
<input type="checkbox"/> Amendment/Response <input type="checkbox"/> Preliminary <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Letter to Official Draftsperson including Drawings [Total Sheets ____]		
<input type="checkbox"/> Petition for Extension of Time		
<input checked="" type="checkbox"/> Supplemental Information Disclosure Statement <input checked="" type="checkbox"/> Form PTO-1449 <input checked="" type="checkbox"/> Copy of IDS Citations labeled B48-B49 and C103-C144		
<input type="checkbox"/> Certified Copy of Priority Document(s)		
<input type="checkbox"/> Sequence Listing submission <input type="checkbox"/> Paper Copy/CD <input type="checkbox"/> Computer Readable Copy <input type="checkbox"/> Statement verifying identity of above		

## CORRESPONDENCE ADDRESS

Direct all correspondence to: Patent Administrator  
Testa, Hurwitz & Thibault, LLP  
High Street Tower  
125 High Street  
Boston, MA 02110  
Tel. No.: (617) 248-7000  
Fax No.: (617) 248-7100

## SIGNATURE BLOCK

Respectfully submitted.  
  
Natasha C. Us  
Attorney for the Applicants  
Testa, Hurwitz & Thibault, LLP  
High Street Tower  
125 High Street  
Boston, MA 02110

Date: February 1, 2005  
Reg. No. 44,381  
Tel. No.: (617) 310-8327  
Fax No.: (617) 248-7100



PATENT  
Attorney Docket No. ASC-025DV2C1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICANTS: Cheng, *et al.*  
SERIAL NO.: 10/802,186 GROUP NO.: 2812  
FILING DATE: March 17, 2004 EXAMINER: Not yet assigned  
TITLE: PROCESS FOR PRODUCING SEMICONDUCTOR ARTICLE USING  
GRADED EPITAXIAL GROWTH

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT**

Sir:

In accordance with the provisions of 37 C.F.R. 1.97 and 1.98, Applicants hereby make of record the patents and publications listed on the accompanying Form PTO-1449, and other information contained herein, for consideration by the Examiner in connection with the examination of the above-identified patent application. In accordance with the U.S. Patent Office's partial waiver of the requirement under 37 C.F.R. 1.98(a)(2)(i), only copies of the foreign patent documents and non-patent publications are enclosed.

**REMARKS**

In accordance with the provisions of 37 C.F.R. 1.97, this statement is being filed (CHECK ONE):

- ☒ (1) within three (3) months of the **filing date** of a national application other than a continued prosecution application under 37 C.F.R. 1.53(d), or within three (3) months of the **date of entry of the national stage** as set forth in 37 C.F.R. 1.491 in an international application, or before the mailing of the **first Office action** on the merits, or before the mailing of a **first Office action** after the filing of a request for continued examination under 37 C.F.R. 1.114; or
- ☐ (2) after the period defined in (1) but before the mailing date of a **final action** or a **notice of allowance** under 37 C.F.R. 1.311, and
- ☐ the requisite Statement is below, **OR**
- ☐ the requisite fee under 37 C.F.R. 1.17(p), namely **\$180.00**, is included herein, or


- ☐ (3) after the mailing date of a **final action** or **notice of allowance** but before the payment of the **issue fee**, **AND**
- ☐ the requisite Statement is below, **AND**
- ☐ the requisite petition fee under 37 C.F.R. 1.17(p), namely **\$180.00** is included herein.

It is respectfully requested that the patents and publications listed on the attached Form PTO-1449, and other information contained herein, be made of record in this application.

Respectfully submitted,

Date: February 1, 2005  
Reg. No. 44,381

Tel. No.: (617) 310-8327  
Fax No.: (617) 248-7100

  
\_\_\_\_\_  
Natasha C. Us  
Attorney for the Applicants  
Testa, Hurwitz, & Thibeault, LLP  
High Street Tower  
125 High Street  
Boston, Massachusetts 02110

FORM PTO - 1449

SUPPLEMENTAL INFORMATION  
DISCLOSURE STATEMENT

ATTY DOCKET NO.: ASC-025DV2C1

APPLICANT(S): Cheng, *et al.*

SERIAL NO.: 10/802,186

FILING DATE: March 17, 2004

GROUP: 2812

## U.S. PATENT DOCUMENTS

EXAM. INIT.		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	A251	5,091,767	02/25/1992	Bean, <i>et al.</i>			
	A252	5,923,046	07/13/1999	Tezuka <i>et al.</i>			
	A253	6,828,214 B2	12/07/2004	Notsu, <i>et al.</i>			04/02/2002

## FOREIGN PATENT DOCUMENTS

EXAM. INIT.		DOCUMENT NUMBER	DATE	COUNTRY CODE	CLASS	SUB CLASS	FILING DATE	ABSTRACT ONLY	ENGLISH LANG (Y/N)
	B48	6-244112	09/02/1994	JP				Y	Y
	B49	9-219524	08/19/1997	JP				N	Y (Abstract only)

## OTHER ART, JOURNAL ARTICLES, ETC.

EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)								
	C103	Batterman, "Hillocks, Pits, and Etch Rate in Germanium Crystals," <u>Journal of Applied Physics</u> , Vol. 28, No. 11 (November, 1957), pp. 1236-1241.							
	C104	Bohg, "Ethylene Diamine-Pyrocatechol-Water Mixture Shows Etching Anomaly in Boron-Doped Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 118, No. 2 (February 1971), pp. 401-402.							
	C105	Brunner <i>et al.</i> , "Molecular beam epitaxy growth and thermal stability of Si <sub>1-x</sub> Ge <sub>x</sub> layers on extremely thin silicon-on-insulator substrates," <u>Thin Solid Films</u> , Vol. 321 (1998), pp. 245-250.							
	C106	Chen <i>et al.</i> , "The Band Model and the Etching Mechanism of Silicon in Aqueous KOH," <u>Journal of the Electrochemical Society</u> , Vol. 142, No. 1 (January 1995), pp. 170-176.							
	C107	Desmond <i>et al.</i> , "The Effects of Process-Induced Defects on the Chemical Selectivity of Highly Doped Boron Etch Stops in Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 141, No. 1 (January 1994), pp. 178-184.							
	C108	Ehman <i>et al.</i> , "Morphology of Etch Pits on Germanium Studied by Optical and Scanning Electron Microscopy," <u>Journal of Applied Physics</u> , Vol. 41, No. 7 (June 1970), pp. 2824-2827.							
	C109	Feijóo <i>et al.</i> , "Etch Stop Barriers in Silicon Produced by Ion Implantation of Electrically Non-Active Species," <u>Journal of the Electrochemical Society</u> , Vol. 139, No. 8 (August 1992), pp. 2309-2313.							
	C110	Finne <i>et al.</i> , "A Water-Amine-Complexing Agent System for Etching Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 114, No. 9 (September 1967), pp. 965-970.							
	C111	Fitzgerald, "GeSi/Si Nanostructures," <u>Annual Review of Materials Science</u> , Vol. 25 (1995), pp. 417-454.							

EXAMINER

DATE CONSIDERED

<b>FORM PTO - 1449</b>				<b>ATTY DOCKET NO.:</b> ASC-025DV2C1					
<b>INFORMATION DISCLOSURE STATEMENT</b>				<b>APPLICANT(S):</b> Cheng, <i>et al.</i>					
				<b>SERIAL NO.:</b> 10/802,186					
				<b>FILING DATE:</b> March 17, 2004					
				<b>GROUP:</b> 2812					
<b>U.S. PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>NAME</b>	<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE IF APPROPRIATE</b>		
<b>FOREIGN PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>COUNTRY CODE</b>	<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE</b>	<b>ABSTRACT ONLY</b>	<b>ENGLISH LANG (Y/N)</b>
<b>OTHER ART, JOURNAL ARTICLES, ETC.</b>									
<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>								
	C112	Frank, "Orientation-Dependent Dissolution of Germanium," <u>Journal of Applied Physics</u> , Vol. 31, No. 11 (November 1960), pp.1996-1999.							
	C113	Fukatsu, "SiGe-based semiconductor-on-insulator substrate created by low-energy separation-by-implanted-oxygen," <u>Applied Physics Letters</u> , Vol. 72, No. 26 (June 29, 1998), pp. 3485-3487.							
	C114	Ghandi <i>et al.</i> , "Chemical Etching of Germanium," <u>Journal of the Electrochemical Society</u> , Vol. 135, No. 8 (August 1988), pp.2053-2054.							
	C115	Godbey et al., "A Si <sub>0.7</sub> Ge <sub>0.3</sub> strained-layer etch stop for the generation of thin layer undoped silicon," <u>Applied Physics Letters</u> , Vol. 56, No. 4 (January 22, 1990), pp. 373-375.							
	C116	Herzog <i>et al.</i> , "X-Ray Investigation of Boron- and Germanium-Doped Silicon Epitaxial Layers," <u>Journal of the Electrochemical Society</u> , Vol. 131, No. 12 (December 1984), pp.2969-2974.							
	C117	Holmes, "The Orientation Dependence of Etching Effects on Germanium Crystals," <u>Acta Metallurgica</u> , Vol. 7, No. 4 (April 1959), pp. 283-290.							
	C118	Huang <i>et al.</i> , "The Impact of Scaling Down to Deep Submicron on CMOS RF Circuits," <u>IEEE Journal of Solid State Circuits</u> , Vol. 33, No. 7 (July 1998), pp. 1023-1036							
	C119	Hunt <i>et al.</i> , "Highly Selective Etch Stop by Stress Compensation for Thin-Film BESOI," <u>1990 IEEE/SOI Technology Conference</u> , (October 2-4, 1990), pp.145-146.							
	C120	Jaccodine, "Use of Modified Free Energy Theorems to Predict Equilibrium Growing and Etching Shapes," <u>Journal of Applied Physics</u> , Vol. 33, No. 8 (August 1962), pp. 2643-2647.							
	C121	Kern, "Chemical Etching of Silicon, Germanium, Gallium, Arsenide, and Gallium Phosphide," <u>RCA Review</u> , Vol. 39 (June 1978), pp. 278-308.							
	C122	Lang <i>et al.</i> , "Bulk Micromachining of Ge for IR Gratings," <u>Journal of Micromechanics and Microengineering</u> , Vol. 6, No.1 (March 1996), pp. 46-48.							
	C123	Leancu <i>et al.</i> , "Anisotropic Etching of Germanium," <u>Sensors and Actuators</u> , A46-47 (1995), pp. 35-37.							
<b>EXAMINER</b>					<b>DATE CONSIDERED</b>				

<b>FORM PTO - 1449</b>				<b>ATTY DOCKET NO.:</b> ASC-025DV2C1					
<b>INFORMATION DISCLOSURE STATEMENT</b>				<b>APPLICANT(S):</b> Cheng, <i>et al.</i>					
				<b>SERIAL NO.:</b> 10/802,186					
				<b>FILING DATE:</b> March 17, 2004					
				<b>GROUP:</b> 2812					
<b>U.S. PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>NAME</b>		<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE IF APPROPRIATE</b>	
<b>FOREIGN PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>COUNTRY CODE</b>	<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE</b>	<b>ABSTRACT ONLY</b>	<b>ENGLISH LANG (Y/N)</b>
<b>OTHER ART, JOURNAL ARTICLES, ETC.</b>									
<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>								
	C124	LeGoues et al., "Relaxation of SiGe thin films grown on Si/SiO <sub>2</sub> substrates," <u>Applied Physics Letters</u> , Vol. 75, No. 11 (June 1, 1994), pp. 7240-7246.							
	C125	Lehmann <i>et al.</i> , "Implanted Carbon: An Effective Etch-Stop in Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 138, No.5 (May 1991), pp. 3-4.							
	C126	Narozny et al., "Si/SiGe Heterojunction Bipolar Transistor with Graded GAP SiGe Base Made by Molecular Beam Epitaxy," <u>IEEE IEDM</u> (1988), pp. 562-565.							
	C127	Palik <i>et al.</i> , "Ellipsometric Study of the Etch-Stop Mechanism in Heavily Doped Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 132, No. 1 (January 1985), pp. 135-141.							
	C128	Palik <i>et al.</i> , "Study of Bias-Dependent Etching of Si in Aqueous KOH," <u>Journal of the Electrochemical Society</u> , Vol. 134, No. 2 (February 1987), pp. 404-409.							
	C129	Palik <i>et al.</i> , "Study of the Etch-Stop Mechanism in Silicon," <u>Journal of the Electrochemical Society</u> , Vol. 129, No. 9 (September 1982), pp.2051-2059.							
	C130	Petersen, "Silicon as a Mechanical Material," <u>Proceedings of the IEEE</u> , Vol. 70, No. 5 (May 1982), pp. 420-457.							
	C131	Powell et al., "New approach to the growth of low dislocation relaxed SiGe material," <u>Applied Physics Letters</u> , Vol. 64, No. 14 (April 4, 1994), pp. 1865-1858.							
	C132	Rai-Choudhury <i>et al.</i> , "Doping of Epitaxial Silicon," <u>Journal of Crystal Growth</u> , Vol. 7 (1970), pp. 361-367.							
	C133	Raley <i>et al.</i> , "(100) Silicon Etch-Rate Dependence on Boron Concentration in Ethylenediamine-Pyrocatechol-Water Solutions," <u>Journal of the Electrochemical Society</u> , Vol. 131, No. 1 (January 1984), pp. 161-170.							
	C134	Seidel et al., "Anisotropic Etching of Crystalline Silicon in Alkaline Solutions," <u>Journal of the Electrochemical Society</u> , Vol. 137, No. 11 (November 1990), pp. 3626-3632.							

<b>EXAMINER</b>	<b>DATE CONSIDERED</b>
-----------------	------------------------

<b>FORM PTO - 1449</b>				<b>ATTY DOCKET NO.:</b> ASC-025DV2C1					
<b>INFORMATION DISCLOSURE STATEMENT</b>				<b>APPLICANT(S):</b> Cheng, <i>et al.</i>					
				<b>SERIAL NO.:</b> 10/802,186					
				<b>FILING DATE:</b> March 17, 2004					
				<b>GROUP:</b> 2812					
<b>U.S. PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>NAME</b>	<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE IF APPROPRIATE</b>		
<b>FOREIGN PATENT DOCUMENTS</b>									
<b>EXAM. INIT.</b>		<b>DOCUMENT NUMBER</b>	<b>DATE</b>	<b>COUNTRY CODE</b>	<b>CLASS</b>	<b>SUB CLASS</b>	<b>FILING DATE</b>	<b>ABSTRACT ONLY</b>	<b>ENGLISH LANG (Y/N)</b>
<b>OTHER ART, JOURNAL ARTICLES, ETC.</b>									
<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>								
	C135	Senna <i>et al.</i> , "Gallium Doping for Silicon Etch Stop in KOH," <u>Transducers '95/Euroensors IX</u> , the 8 <sup>th</sup> International Conference on Solid-State Sensors and Actuators and Euroensors IX, Stockholm, Sweden, June 25-29, 1995, pp. 194-195.							
	C136	Shang <i>et al.</i> , "The Development of an Anisotropic Si Etch Process Selective to Ge <sub>x</sub> Si <sub>1-x</sub> Underlayers," <u>Journal of the Electrochemical Society</u> , Vol. 141, No. 2 (February 1994), pp. 507-510.							
	C137	Soderberg, "Fabrication of BESOI-Materials Using Implanted Nitrogen as an Effective Etch Stop Barrier," <u>1989 IEEE SOS/SOI Technology Conference</u> , (October 3-5, 1989), pp. 64.							
	C138	Sundaram <i>et al.</i> , "Electrochemical etching of Silicon by Hydrazine," <u>Journal of the Electrochemical Society</u> , Vol. 140, No. 6 (June 1993), pp.1592-1597.							
	C139	Sze, "Physics of Semiconductor Devices." (1991).							
	C140	Takagi <i>et al.</i> , "On the Universality of Inversion Layer Mobility in Si MOSFET's: Part I-Effects of Substrate Impurity Concentration," <u>IEEE Transactions on Electron Devices</u> , Vol. 41, No. 12 (December 1994), pp. 2357-2362.							
	C141	Ting <i>et al.</i> , "Monolithic Integration of III-V Materials and Devices on Silicon," Part of the SPIE Conference on Silicon-Based Optoelectronics, San Jose, CA. (January 1999), pp. 19-28.							
	C142	Vol'fson <i>et al.</i> , "Fundamental Absorption Edge of Silicon Heavily Doped with Donor or Acceptor Impurities," <u>Soviet Physics Semiconductors</u> , Vol. 1, No. 3 (September 1967), pp. 327-332.							
	C143	Wu, "Novel Etch-Stop Materials for Silicon Micromachining," Thesis Submitted to the Massachusetts Institute of Technology Department of Materials Science and Engineering on May 9, 1997, pp. 1-62.							
	C144	Yi <i>et al.</i> , "Si <sub>1-x</sub> Ge <sub>x</sub> /Si Multiple Quantum Well Wires Fabricated Using Selective Etching," <u>Materials Research Society Symposium Proceedings</u> , Vol. 379 (1995), pp. 91-96.							

<b>EXAMINER</b>	<b>DATE CONSIDERED</b>
-----------------	------------------------

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: Cheng, *et al.*  
SERIAL NO.: 10/802,186 GROUP NO.: 2812  
FILING DATE: March 17, 2004 EXAMINER: Not yet assigned  
TITLE: PROCESS FOR PRODUCING SEMICONDUCTOR ARTICLE USING  
GRADED EPITAXIAL GROWTH

**CERTIFICATE OF FIRST CLASS MAILING UNDER 37 C.F.R. 1.8**

I hereby certify that this correspondence, and any document(s) referred to as enclosed herein, is/are being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to the Mail Stop Amendment Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 1<sup>st</sup> day of February, 2005.

  
Mary Hutchinson

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Submitted herewith are: Transmittal Form (1 page); Supplemental Information Disclosure Statement (2 pages); Form PTO-1449 (4 pages); References B48-B49 and C103-C144; and a return receipt postcard.

3171649\_1